

**BP Control Systems Issues Documents**  
**APPENDIX F TO EXPERT REPORT OF MIKE SAWYER**

<b>LATEST DATE ON EMAIL(S)</b>	<b>BC#</b>	<b>EMAIL SUBJECT TITLE</b>	<b>DESCRIPTION</b>
1/22/07	BPEP_ABB_03498616-8620	"RE: Operations Managers Meeting and Higher -" forwarding e-mails titled "RE: Additional Equipment for Atlantis"	Very long e-mail chain ending w/email from Peloubet saying MOC needed for any software upgrade/update/modification. Chain starts with email requesting equipment for Atlantis server equipment room with responses that MOC review is needed for same. There are various email responses including: Ragan saying there is no specific design for where software resides and no issued design document; Brown saying Operations Mgrs need to approve and "need a way and means to have the logic or software changes MOC and checked to prevent what happened on the PLC 8 and Aux Generator from reoccurring," and "this is not going to be able to be handled by our current MOC review process because most of us are not literate enough on software to actually understand the changes being made and their impacts."
2/7/07	BPEP_ABB_03665283	[NOT AN EMAIL] FMC Engineering Change Note: CM 500000059845	4152 BP Atlantis. Reason for change: New TPU Software Release 163.2.4
3/13/07	BPEP_ABB_03665284	[NOT AN EMAIL] FMC Engineering Change Note: CM 500000060416	4152 BP Atlantis. Reason for change: New TPU Software Release 163.2.5
9/22/07	BPEP_ABB_03502155-2157	RE: Status Update Saturday 12:25	E-mail chain re: control system problem: "As they begin the black start the control system is sending a signal to shut down the generators"; E-mail chain indicates "The problem with the control system has been resolved and the Aux. Generator is running."
10/5/07	BPEP_ABB_00092830-2832	[NOT AN EMAIL] Atlantis Management of Change - Temporary MOC to allow Well Start-up without Operational FAM	"During well commissioning, the fast-close feature of the FAMs (fast acting module) were discovered to be in-operable on the DC112, DC113 and DC114 wells....This is a temporary MOC to allow DC113, DC112, and DC114 well start-up without an operational FAM"
11/29/07	BPEP_ABB_00092929-?	[NOT AN EMAIL] BP Atlantis Project Operations/HUC MOC'S	List MOCs, Action By and Required Date.

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12/20/07	BPEP_ABB_03501101-1102	RE: Controllers failure, causing OSD	E-mail chain re: controllers failure: "...the transmitter failed and would have caused a OSD..." "The concern is that a large leak would overflow the sump and go directly to sea."; Reason for failure still being discussed at end of e-mail chain.
1/2/08	BPEP_ABB_03512909-2911	RE: TRACTION E-mail: Incident Report Approval Required	E-mail chain re: valve malfunction/"Near Miss": "This time the lower part of the screen on ST showed tree valves being commanded to open. This was not expected or desired from Smart Tool. FMC engineer was not aware that there was a function which allowed all the valves to be opened."
1/3/08	BPEP_ABB_03512831 (Disc Exh 216 - Berger Depo)	RE: LIM alarms	Email from Young to Oza and Berger re: SPCU Lines 1 and 2 showing offnormal: "It seems that there is either a noise problem or logic problem. It is likely an FMC problem to address."
1/3/08	BPEP_ABB_03512848-2850	RE: TRACTION E-mail: Incident Report Approval Required	E-mail chain w/final e-mail from Broman approving incident report 2007-IR-2502130
1/7/08	BPEP_ABB_03559672-9673 (Disc Exh 217 - Berger Depo)	Re: Subsea valves opening without request	Email chain: "This morning from approximately 1am until approximately 4:30am, the XOY and possibly other valves on DC124 opened multiple times without being requested by the operator." "...felt that the SmartTool was the culprit."
1/7/08	BPEP_ABB_03560235	FW: Subsea valves opening without request	Oza Email advising FMC to take a look at above issue
1/7/08	BPEP_ABB_04125309-5310	FW: Subsea valves opening without request	Oza email forwarding 1st 1/7 email re: DC124 valves opening. Event Log and DC124 Trends are now attached to this e-mail. Excel spreadsheet attachment list series of events which originate 1/6 @ 11:24pm and end on 1/7 @ 5:08am; approx 1,000 events where parts of the system acted independent of some action initiated by an operator or normal course of action.
1/9/08	BPEB_ABB_03513076	FW: DC 124 valve opening	Oza further Email re: above: "Further to my note on sand detector being available..."
1/9/08	BPEP_ABB_03513072	RE: DC 124 re start	Oza Email/Email chain re: plan of action concerning inadvertent opening of valves (DC124) is to reset the Prosoft cars on SPCU 1 (subsea power and comms unit)



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1/9/08	BPEP_ABB_03513077	DC 124 valve opening	Oza Email: "...had another inadvertent valves opening this evening.." "...may need to shutdown the SPCU and restart it again. This may not go down with the PE as they may loss some data."
1/9/08	BPEP_ABB_03554858	Nightly Report 01/09/08	Email advising status of several issues including re DC 124 PSC: "still not sure what caused this alarm" and DC-143 commission activities.
1/9/08	BPEP_ABB_03554862 (Disc Exh 218 - Berger Depo)	FTP pressure SD's?	Broman Email to Berger asking for confirmation of no FTP SD login in the ATL SS control system, and his discussions with others about what could happen without it: "was briefing...on why we would not want to just wing open the chokes and let wells float on manifold pressure...what could happen without FTP SD logic...a lot of eyes got pretty big."
1/9/08	BPEP_ABB_03554885	RE: Strange Choke Behavior	Berger Response/Email chain re: choke not closing on DC-143
1/9/08	BPEP_ABB_03554894	FW: ST Logs	Email chain from Ragan to Burghardt and Knight with attach ST_Logs.zip mention same time stamp fr last night; Smart Tool computer turned on again; disconnected network until further notice.
1/9/08	BPEP_ABB_03559338	FAMs during SD today	Email from Young to Berger and Oza advising that on fast close command DC-112 and DC-113 FAM failed/chokes did not close
1/9/08	BPEP_ABB_03559371-9372	RE: Nightly Report 01/08/08	Berger Email/Email chain re: DC-113 Leak and trying to determine leak source
1/9/08	BPEP_ABB_03559378	DC-124 valve malfunctions	Byrd Email to OZA re: another valve malfunction: "...another alarm came in on SPCU#1. Now the LIM Alarm is OFF NORMAL for both SEM A & B. The same LIM alarms are also on SPCU #2..."
1/9/08	BPEP_ABB_03559386	RE: DC 124 valve opening	Email from Angel attaching slide describing incident above: "Wanda and I agreed that if DC124 shuts in tonight we will not restart it. "Please note that DC124 acoustic detector raw counts currently can't be viewed with ProcessNet."
1/10/08	BPEP_ABB_03513064-3065	RE: pod testing	Oza/G. Malone etc. Emails re: SEM A and B Testing, and downhole gauges not working "last year": "The gauges on SEM A were not working, and SEMB middle gauge is still not working."
1/10/08	BPEP_ABB_03513069	RE: 143?	Emails between Oza and Broman re: DC 143 and DC 124 (controls issues): controls issues may be "smoothing out some"

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1/10/08	BPEP_ABB_03554824-4825	FW: DC 124 re start	Email chain re individual well shut-down request: Berger states, "I would also like to use this issue to initiate an RFA to allow individual well shut-downs. ...would like to be able to set low tubing pressure shut-downs on each well. That way, in the future, if the XOV and DXV open, or the choke opens more, or another well shuts-in, the LTP shutdown would protect the completion. I tried to get these in about a year ago but the honeywell folks indicated there were too many road blocks to make it work in the time that was available."
1/15/08	BPEP_ABB_03513032 (Disc Exh 219 - Berger Depo)	Shutdowns for DC123, DC143	Email from Oza to various: "...we still have IWLs on both DC123 and DC143 to commission the shutdown logics as they were not carried out as P2 riser was not available."
1/16/08	BPEP_ABB_03554200-4201	RE: DHPT Time-Stamp Problems DC-124	Email chain re: DC124 and DC143 problem with sem A gauge data response being 3-5 minutes behind
1/19/08	BPEP_ABB_03553990	FW: DHPT Time-Stamp Problems DC-124	Email chain re: why SEM time may be off
1/23/08	BPEP_ABB_03553786-3789	Fw: BP Atlantis Communications Issue	Email chain w/various questions concerning Smart Tool and LIM Alarm Issues. Dean/Technip ending e-mail indicates they should "keep an eye on DC-123 as this is the only well we having running on SEM A from this SBC-1A in SPCU-1" and that he would check "trends of the down-hole data to see if the resetting...corrected the phase shift...experienced earlier." Also indicated re: LIM Alarms that FMC hand would be arranged for troubleshooting these issues and the "sporadic valve operation."
1/29/08	BPEP_ABB_03553479-3482	RE: MCS SPCU ST Questions	Email chain w/various questions concerning Smart Tool and LIM Alarm issues. Final e-mail is from Dean at Technip w/his answers for the problems. (NOTE: Contains same chain as email dated 1/23/08 above)
2/11/08	BPEP_ABB_03514570-4575	RE: Black start on the 10th Feb	Email chain re: power going down and no PSL on DC123, DC124 and DC143
2/28/08	BPEP_ABB_03513649-3650	2008-02-28 Subsea Installation Team Daily Report	Report of work done (could deal w/some issues identified above).



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3/26/08	BPEP_ABB_03561560-1562	NOT AN EMAIL: Technip Engineering/Technical Document Transmittal	Submitting for disposition MOC 1044 Subsea MCS PLC Expansion Diagrams with cover titled "Document Control Sheet for Document Handover to Operations"
4/11/08	BPEP_ABB_03476551-6552	Fw: 3478-ETR-3566 - Installation/Commissioning Procedure, Test Procedure, BP Atlantis Smarttool to SCM Communication Test (BPAT2710A) - Rev C.	Email from Dean/Technip attaching latest revision of the FMC power & comms test procedure, and advising of tests performed and results.
5/21/08	BPEP_ABB_3565976	FW: SEM 150 CPU Ram Chip	Email chain from Chan to Fleming, Curran, Oza, Young re issues with CPU RAM Chips used in FMC SEM - could cause pod communication and data handling problem.
5/23/08	BPEP_ABB_03626303-6304	[NOT AN EMAIL] Letter from FMC to Broman/BP; Subject: Product Notification (Subsea Control Module - SEM150 CPU RAM Chip)	Letter states FMC has noticed "a small number of subsea communication and data handling issues that have been traced to a specific batch of RAM chips used on the CPU board included in the [SEM] inside the SCM." "FMC has been working with CPU board manufacturer to understand the root cause and develop corrective actions..." "Both Atlantis affected SCMs are not installed so FMC recommends that these SCMs be refurbished."
6/19/08	BPEP_ABB_03570183-0188	RE: Oil in Annulus on 822#9 due to ABV1&2 leaking	Long Email Chain re: oil bleeding into annulus, leaking valves and whether there were continuous type problems. One e-mail indicates one of the events was due to an override by the smart tool. Ends with e-mails trying to schedule conference to discuss the problems.
6/20/08	BPEP_ABB_03570124-0127	Spares listing on SPCU on PQ	FMC email to Oza, etc. sending a list of spares for SPCU.
7/28/08	BPEP_ABB_03574176-4183	[NOT AN EMAIL] Work Control Certificate: 00002036 Permit Electrical Authorized	Work Control Requesting Task: "Troubleshoot SPCU-2 Single Board Computer 1B to determine reasoning for faults. Refer to GC787-SS-044 FMC SBC Diagnostics SPCU-2 SBC-2B rev2.doc for procedural steps."
7/30/08	BPEP_ABB_03574021	RE: JPK Electronics Control Engineer to provide assistance	Email from Chan: "Atlantis team now plans to focus on troubleshoot (sic) the Single Board Computer (SBC) which has failed a few months ago. If the SBC is the cause of the lost comms, we will need to have an EE from JPK assist the root cause analysis."

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8/4/08	BPEP_ABB_03627541-7543	RE: GC743, DC111 and DC112 Well Communication Reestablished	Email chain that begins 7/29/08 from Schutte advising subsea communications had been lost with ATL Project wells DC-111 and DC112 in Green Canyon 743, OCSG 15607. Communications were then indicated to have been reestablished per 8/1/08 email from Sustala to MMS. Final 8/4/08 email from Sustala to MMS states no further communications issues and that cause of failure is believed to have been "control hardware that was replaced by the vendors."
8/5/08	BPEP_ABB_03627433-7436	FW: Atlantis - update	Email from Chan to Oza etc. frwdg e-mail report on comms problems from L. Scott at JPK and attachg SBC card failure history. 8 issues were listed. "There is a technical problem but it is not clear if this is design or manufacturing...it appears SBC card 'froze'...system was running blind for some time and no one noticed until the flat-lining DHPT data was spotted...first card failure was seen in February 2008...are implications for Thunderhorse...discussed possible causes including temperature, vibration, dodgy connections..." etc.
8/6/08	BPEP_ABB_03627300	ALERT!!! - SPCU SBC Issue	Email from Berger: "We found out this week from FMC that all the [SBCs] in the SPCU have a known issue with the current firmware installed." "...whenever the subsea choke is commanded to move to a position, and then aborted by using the 'STOP' command, then the SBC may reset (or disappear out of Smart-tool as FMC says). Advises of process FMC says will correct. States there is firmware update that corrects choke problem but is several wks from availability and testing must be done to ensure new firmware is compatible before boards can be updated.
8/6/08	BPEP_ABB_03627310-7311	Subsea Test System	Email from Cotton to Oza attaching \$47,020.09 quote for subsea test startup hardware which was discussed during project development but was "too expensive." States "a better way to approach this would be to setup a temporary system using some of our available spare components." "This system would be for testing the existing boards, modifying the comms failure alarms and resting the new firmware if we decide to upgrade."



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8/6/08	BPEP_ABB_03627334-7335 (Disc Exh 221 - Berger Depo)	BP Atlantis Single Board Computer Issues Meeting Minutes - 8/04/08	Email outlining minutes from meeting on SBC issues. Discusses board problems, reasons for same and action items resulting there from.
8/6/08	BPEP_ABB_03627336-7337	RE: PQ SBC Systemic Failures	Email from Dean/Technip to Oza, etc. attaching doc titled "PQ SBC Failures" and advising "This is serious and should be addressed to Norway". Attchmt discusses loss of communications with wells DC11 (sic) and DC112 on both A and B SEM, couldn't restart SBCs that communicate w/those modems, removed SBCs. Also mentions that this occurred in March on DC121 and DC122 but at that time boards were restarted w/no problem, and no tech reports were rec'd on March testing.
8/6/08	BPEP_ABB_03627339-7341	RE: Subsea Communication Loss Detection on Thunder Horse and Atlantis	Email chain ending w/email from Knott/Technip re: getting MOC approval to deal w/single board computer failures within FMC Topside Electronic Modules and Subsea communication loss. He says once approved, he can give Honeywell the green light to make change. In earlier e-mail in chain, he says "what needs to be done and will be covered in the MOC is that we need the logic to be coded to enable a loss of communications (either on the A or B side of the cabinet) when we loose this link."
8/6/08	BPEP_ABB_03627348 (Disc Exh 220 - Berger Depo)	RE: Subsea Communication Loss Detection on Thunder Horse and Atlantis	Email chain re: Atlantis experiencing a "number of Single Board Computer (SBC) failures within the FMC Topsides Electronics," reasons for occurrence and actions taken.
8/8/08	BPEP_ABB_03626991	NOTHING IN SUBJECT LINE	Email discussing boards failing to boot and what should be done.
8/10/08	BPEP_ABB_03626943	RE: DC122 Shut in	Further e-mail from Taylor forwarding above chain e-mail. States, "if you remove the last filter under description you can see that just before SEM A alarm there was two alarms on the LP Return Pressure."
8/10/08	BPEP_ABB_03626944-6945	RE: DC122 Shut in	Email chain from Little to Taylor & Berger w-attchd event report from Subsea server. 1st email advised, "Several alarms came in on DC122...well page showed that the...valves were in Failure...and the SEM A was showing 22 VAC." Choke PSIs all dropping. Attchd report shows "DC-122 SEM A STATUS has had a OFFNORML status several times...."

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8/11/08	BPEP_ABB_03626829-6834	DC113, OCSG 15607, Departure from Continuous Monitoring	Long e-mail chain starting 6/22/08 and ending w-8/11/08 email from Sustala stating deadline to address AMV issue at DC113 (w/MMS) is 8/14/08. Other e-mails in chain: 8/22-Sustala to MMS updating faulty Annulus Master Valve (AMV) Rpt on DC113 and rqstg "Departure from requirement for continuous production annulus monitoring of this subsea well." Other e-mails to MMS in chain request various approvals from MSS and provide updates on situation.
8/12/08	BPEP_ABB_03626731-6736	RE: DC113, OCSG 15607, POD Replacement Update/Extension Request for Continuous Annulus Monitoring	Email chain including e-mails in entry above w/final e-mail from Berger to Sustala etc advising "we need to ask for an extension [from MMS]. We have the hardware procured and tested. ...still need additional time for the software changes required to interact w (sic) the ess (sic)."
8/13/08	BPEP_ABB_03625319-6324	RE: DC113, OCSG 15607, AMV Repair Work Update/Extension Request	Sustala Email to MMS giving status of repairs to AMV at DC113, and proposing a further waiver extension. "We request an additional three weeks to complete and test all the scope changes necessary for the retrofit of the external actuator on the DC113 AMV."
8/13/08	BPEP_ABB_03626300-6302	RE: DC122 Shut-in Root Cause	Email chain wherein Berger asks FMC if Atlantis is affected by faulty SEM CPU RAM chip as discussed in May ltr from FMC (attached to this e-mail and individual entry on spreadsheet for May 2008) after unplanned shut-in occurs on DC122. FMC answers that although there are no SMCs on ATL Subsea that contain a RAM chip from the problem batch, "There are two SCMs on Atlantis that do have the suspect RAM chips, these SCMs are in the process of being reworked."
8/13/08	BPEP_ABB_03626305-6307	BP Atlantis Single Board Computer Issues Meeting Minutes - 8/12/08	Email outlining minutes from meeting on SBC issues. Discusses board problems, reasons for same and action items resulting there from.
8/14/08	BPEP_ABB_03626249-6250	Request for DC113 SBC Software Changes	Email from Berger to FMC requesting that FMC change software to existing SBCs in the ATL SPCU that affect the DC113 well. Requested changes are described. Attached to e-mail is modified DC-113 Tree Schematic.



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8/15/08	BPEP_ABB_03626098	RE: Learnings from DC122 Shut-in on 10-Aug-2008	Email chain wherein Berger sends recommendations and data information resulting from DC122 Shut-In; and Herrmann responds in agreement. Recommendations include changing "philosophy on the operation of software so we can catch diagnostic data we need to troubleshoot these complex problems." Doesn't think it is Smart Tool issue, but rather a board issue or a PQ Tech reset.
8/17/08	BPEP_ABB_03626025	RE: DC-122 SEM A Issues	Byrd e-mail to Berger giving update on number of alarms being received on DC-122 SEM A. "Aug 16th, SEM A went 'OFFNORMAL' a total of 9 times. Each time it went back to Normal as it did on Aug 15th..."
8/18/08	BPEP_ABB_03587310-7312	RE: DC122 A - CONTINUOUS LINE A FAULT	Berger e-mail reporting "continuous fault on DC 122 Line A." Bristol responds stating "Benoj is also checking into this alarm and should provide an e-mail later."
8/18/08	BPEP_ABB_03587316	RE: DC-122 SEM A Issues	Email Chain from Snow to Berger, Byrd, Oza, Young, Herrman, Gipson, Gardner, Ross w attachment SMT_EXP_Logs_20080815-18.zip researching why the smart tool did not log any of the event on Friday.
8/18/08	BPEP_ABB_03606612	RE DC-122 SEM A Issues	Email chain beginning w/8/17 e-mail below re: DC-122 SEM A alarms. Snow forwards Experian events and SMT logs (not attached) and Herrmann commends Snow and Berger for a "great job on working this issue."
8/19/08	BPEP_ABB_03587091-7096	RE: 122 Info	Snow to Berger Email including e-mail chain re: DC122 shut-in occurrence. Says symptoms seen on SPCU 2 SEM B SBC2B "appear to be the same as what I observed months ago when one of the other Motorola boards were changed out...SBC was basically not booting up correctly and fully." Says he feels problem "goes directly to the SBC hardware or software that is running on it." Need better understanding of how FMC system operates.
8/19/08	BPEP_ABB_03587114-7119	RE: 122 Info	Honeywell e-mail responding to e-mail chain re: DC122 shut-in occurrence. Attaches "MV112A, which is associated with DC-122 A side, [and] has not indicated a no connection nor a fault during the time period where the Smart Tool is indicating SCU disconnect." An email in chain shows portion of Smart Tool log attaching "operator notes with issues on 113/114."

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8/19/08	BPEP_ABB_03587212-7216	RE: 122 Info	Email chain re: DC122 shut-in occurrence. Furneaux says it "looks like the MVI modules that connect to the SCU are disconnected or they are trying to connect and disconnecting again. Berger replies that "this sounds like the dc114/113 problem." An email in chain shows portion of Smart Tool log attaching "operator notes with issues on 113/114."
8/19/08	BPEP_ABB_03587243-7246	FW: 122 Info	Email chain re: DC122 shut-in occurrence. Berger recaps what is known and asks Benoj for assessment.
8/20/08	BPEP_ABB_03586853	Atlantis --- SBC RCA update	Email from Chan to Berger, etc. advising he is mtg w/McIntosh for an update of SBC RCA. Recaps and actions are included in update.
8/20/08	BPEP_ABB_03587019-7026	RE: 122 Info	Long e-mail chain frwdg some from above, with final e-mail in chain from Chan re: testing process. In this chain, Berger says a "detailed log of all the controls issue events " is needed, as well as "a spreadsheet listing ALL the Atlantis SBC by serial number....spreadsheet needs to track each board from cradle to grave." Final e-mail also mentions need to follow up on "113 AMV software change progress."
8/20/08	BPEP_ABB_03587047-7059	RE: 122 Info	Cotton Email to Snow and Berger telling them he agrees they should be involved in system testing at FMC office. "Current set of problems may be limited to the SBCs but we've identified several issues relating to the comms interface between the FMC equipment and the ControlLogix/Prosoft modules."
8/21/08	BPEP_ABB_03579642	Emailing: SMT_Logs_20080820.zip	Email from Snow to Berger attach SMT_Logs_20080820.zip
8/21/08	BPEP_ABB_03586626-6627	RE: update of RCA effort	Email exchanges re: status of SBC issues. Mentions frustration due to no clear FMC plan to diagnose problem and inability to "commence the root cause analysis until we know what has failed or is malfunctioning on the board." R. Fleming. States awareness that boards have been tested by FMC in Houston and are now being tested by FMC in Norway, but requests the outline plan with a timeline.